User Guide

Twisted Pair

VTT001 and VTR001

Twisted Pair Transmitter and Receiver

Extron® Electronics
INTERFACING, SWITCHING AND CONTROL

68-760-01 Rev. H
06 11

Safety Instructions • English

This symbol is intended to alert the user of important operating and maintenance (servicing) instructions in the literature provided with the equipment.

This symbol is intended to alert the user of the presence of uninsulated dangerous voltage within the product's enclosure that may present a risk of electric shock.

Caution

Read Instructions • Read and understand all safety and operating instructions before using the equipment.

Retain Instructions • The safety instructions should be kept for future reference.

Follow Warnings • Follow all warnings and instructions marked on the equipment or in the user information.

Avoid Attachments • Do not use tools or attachments that are not recommended by the equipment manufacturer because they may be hazardous.

Warning

Power sources • This equipment should be operated only from the power source indicated on the product. This equipment is intended to be used with a main power system with a grounded (neutral) conductor. The third (grounding) pin is a safety feature, do not attempt to bypass or disable it.

Power disconnection • To remove power from the equipment safely, remove all power cords from the rear of the equipment, or the desktop power module (if detachable), or from the power source receptacle (wall plug).

Power cord protection • Power cords should be routed so that they are not likely to be stepped on or pinched by items placed upon or against them.

Servicing • Refer all servicing to qualified service personnel. There are no user-serviceable parts inside. To prevent the risk of shock, do not attempt to service this equipment yourself because opening or removing covers may expose you to dangerous voltage or other hazards.

Slots and openings • If the equipment has slots or holes in the enclosure, these are provided to prevent overheating of sensitive components inside. These openings must never be blocked by other objects.

Lithium battery • There is a danger of explosion if battery is incorrectly replaced. Replace it only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Consignes de Sécurité • Français

Ce symbole sert à avertir l'utilisateur que la documentation fournie avec le matériel contient des instructions importantes concernant l'exploitation et la maintenance (réparation).

Ce symbole sert à avertir l'utilisateur de la présence dans le boîtier de l'appareil de tensions dangereuses non isolées posant des risques d'électrocution.

Attention

Lire les instructions• Prendre connaissance de toutes les consignes de sécurité et d'exploitation avant d'utiliser le matériel.

Conserver les instructions• Ranger les consignes de sécurité afin de pouvoir les consulter à l'avenir.

Respecter les avertissements • Observer tous les avertissements et consignes marqués sur le matériel ou présentés dans la documentation utilisateur.

Eviter les pièces de fixation • Ne pas utiliser de pièces de fixation ni d'outils non recommandés par le fabricant du matériel car cela risquerait de poser certains dangers.

Avertissement

Alimentations • Ne faire fonctionner ce matériel qu'avec la source d'alimentation indiquée sur l'appareil. Ce matériel doit être utilisé avec une alimentation principale comportant un fil de terre (neutre). Le troisième contact (de mise à la terre) constitue un dispositif de sécurité : n'essayez pas de la contourner ni de la désactiver.

Déconnexion de l'alimentation• Pour mettre le matériel hors tension sans danger, déconnectez tous les cordons d'alimentation de l'arrière de l'appareil ou du module d'alimentation de bureau (s'il est amovible) ou encore de la prise secteur.

Protection du cordon d'alimentation • Acheminer les cordons d'alimentation de manière à ce que personne ne risque de marcher dessus et à ce qu'ils ne soient pas écrasés ou pincés par des objets.

Réparation-maintenance • Faire exécuter toutes les interventions de réparation-maintenance par un technicien qualifié. Aucun des éléments internes ne peut être réparé par l'utilisateur. Afin d'éviter tout danger d'électrocution, l'utilisateur ne doit pas essayer de procéder lui-même à ces opérations car l'ouverture ou le retrait des couvercles risquent de l'exposer à de hautes tensions et autres dangers.

Fentes et orifices • Si le boîtier de l'appareil comporte des fentes ou des orifices, ceux-ci servent à empêcher les composants internes sensibles de surchauffer. Ces ouvertures ne doivent jamais être bloquées par des objets.

Lithium Batterie • Il a danger d'explosion s'll y a remplacment incorrect de la batterie. Remplacer uniquement avec une batterie du meme type ou d'un ype equivalent recommande par le constructeur. Mettre au reut les batteries usagees conformement aux instructions du fabricant.

Sicherheitsanleitungen • Deutsch

Dieses Symbol soll dem Benutzer in der im Lieferumfang enthaltenen Dokumentation besonders wichtige Hinweise zur Bedienung und Wartung (Instandhaltung) geben.

Dieses Symbol soll den Benutzer darauf aufmerksam machen, daß im Inneren des Gehäuses dieses Produktes gefährliche Spannungen, die nicht isoliert sind und die einen elektrischen Schock verursachen können, herrschen.

Achtung

Lesen der Anleitungen • Bevor Sie das Gerät zum ersten Mal verwenden, sollten Sie alle Sicherheits-und Bedienungsanleitungen genau durchlesen und verstehen.

Aufbewahren der Anleitungen • Die Hinweise zur elektrischen Sicherheit des Produktes sollten Sie aufbewahren, damit Sie im Bedarfsfall darauf zurückgreifen können.

Befolgen der Warnhinweise • Befolgen Sie alle Warnhinweise und Anleitungen auf dem Gerät oder in der Benutzerdokumentation.

Keine Zusatzgeräte • Verwenden Sie keine Werkzeuge oder Zusatzgeräte, die nicht ausdrücklich vom Hersteller empfohlen wurden, da diese eine Gefahrenquelle darstellen können.

Vorsicht

Stromquellen • Dieses Gerät sollte nur über die auf dem Produkt angegebene Stromquelle betrieben werden. Dieses Gerät wurde für eine Verwendung mit einer Hauptstromleitung mit einem geerdeten (neutralen) Leiter konzipiert. Der dritte Kontakt ist für einen Erdanschluß, und stellt eine Sicherheitsfunktion dar. Diese sollte nicht umgangen oder außer Betrieb gesetzt werden.

Stromunterbrechung • Um das Gerät auf sichere Weise vom Netz zu trennen, sollten Sie alle Netzkabel aus der Rückseite des Gerätes, aus der externen Stomversorgung (falls dies möglich ist) oder aus der Wandsteckdose ziehen.

Schutz des Netzkabels • Netzkabel sollten stets so verlegt werden, daß sie nicht im Weg liegen und niemand darauf treten kann oder Objekte darauf- oder unmittelbar dagegengestellt werden können.

Wartung • Alle Wartungsmaßnahmen sollten nur von qualifiziertem Servicepersonal durchgeführt werden. Die internen Komponenten des Gerätes sind wartungsfrei. Zur Vermeidung eines elektrischen Schocks versuchen Sie in keinem Fall, dieses Gerät selbst öffnen, da beim Entfernen der Abdeckungen die Gefahr eines elektrischen Schlags und/oder andere Gefahren bestehen.

Schlitze und Öffnungen • Wenn das Gerät Schlitze oder Löcher im Gehäuse aufweist, dienen diese zur Vermeidung einer Überhitzung der empfindlichen Teile im Inneren. Diese Öffnungen dürfen niemals von anderen Objekten blockiert werden.

Litium-Batterie • Explosionsgefahr, falls die Batterie nicht richtig ersetzt wird. Ersetzen Sie verbrauchte Batterien nur durch den gleichen oder einen vergleichbaren Batterietyp, der auch vom Hersteller empfohlen wird. Entsorgen Sie verbrauchte Batterien bitte gemäß den Herstelleranweisungen.

Instrucciones de seguridad • Español

Este símbolo se utiliza para advertir al usuario sobre instrucciones importantes de operación y mantenimiento (o cambio de partes) que se desean destacar en el contenido de la documentación suministrada con los equipos.

Este símbolo se utiliza para advertir al usuario sobre la presencia de elementos con voltaje peligroso sin protección aislante, que puedan encontrarse dentro de la caja o alojamiento del producto, y que puedan representar riesgo de electrocución.

Precaucion

Leer las instrucciones • Leer y analizar todas las instrucciones de operación y seguridad, antes de usar el equipo.

Conservar las instrucciones • Conservar las instrucciones de seguridad para futura consulta.

Obedecer las advertencias • Todas las advertencias e instrucciones marcadas en el equipo o en la documentación del usuario, deben ser obedecidas.

Evitar el uso de accesorios • No usar herramientas o accesorios que no sean especificamente recomendados por el fabricante, ya que podrian implicar riesgos.

Advertencia

Alimentación eléctrica • Este equipo debe conectarse únicamente a la fuente/tipo de alimentación eléctrica indicada en el mismo. La alimentación eléctrica de este equipo debe provenir de un sistema de distribución general con conductor neutro a tierra. La tercera pata (puesta a tierra) es una medida de seguridad, no puentearia ni eliminaria.

Desconexión de alimentación eléctrica • Para desconectar con seguridad la acometida de alimentación eléctrica al equipo, desenchufar todos los cables de alimentación en el panel trasero del equipo, o desenchufar el módulo de alimentación (si fuera independiente), o desenchufar el cable del receptáculo de la pared.

Protección del cables de alimentación • Los cables de alimentación eléctrica se deben instalar en lugares donde no sean pisados ni apretados por objetos que se puedan apoyar sobre ellos.

Reparaciones/mantenimiento • Solicitar siempre los servicios técnicos de personal calificado. En el interior no hay partes a las que el usuario deba acceder. Para evitar riesgo de electrocución, no intentar personalmente la reparación/mantenimiento de este equipo, ya que al abrir o extraer las tapas puede quedar expuesto a voltajes peligrosos u otros riesgos.

Ranuras y aberturas • Si el equipo posee ranuras o orificios en su caja/alojamiento, es para evitar el sobrecalientamiento de componentes internos sensibles. Estas aberturas nunca se deben obstruir con otros objetos.

Batería de litio • Existe riesgo de explosión si esta batería se coloca en la posición incorrecta. Cambiar esta batería únicamente con el mismo tipo (o su equivalente) recomendado por el fabricante. Desachar las baterías usadas siguiendo las instrucciones del fabricante.

安全须知 • 中文

这个符号提示用户该设备用户手册中有重要的操作和维护说明。

这个符号警告用户该设备机壳内有暴露的危险电压，有触电危险。

注意

阅读说明书 • 用户使用该设备前必须阅读并理解所有安全和使用说明。

保存说明书 • 用 户应保存安全说明书以备将来使用。

遵守警告 • 用户应遵守产品和用户指南上的所有安全和操作说明。

避免追加 • 不要使用该产品厂商没有推荐的工具或追加设备，以避免危险。

警告

电源 • 该设备只能使用产品上标明的电源。 设备必须使用有地线的供电系统供电。 第三条线（地线）是安全设施，不能不用或跳过 。

拔掉电源 • 为安全地从设备拔掉电源，请拔掉所有设备后或桌面电源的电源线，或任何接到市电系统的电源线。

电源线保护 • 妥善布线， 避免被踩踏，或重物挤压。

维护 • 所有维修必须由认证的维修人员进行。 设备内部没有用户可以更换的零件。为避免出现触电危险不要自己试图打开设备盖子维修该设备。

通风孔 • 有些设备机壳上有通风槽或孔，它们是用来防止机内敏感元件过热。 不要用任何东西挡住通风孔。

锂电池 • 不正确的更换电池会有爆炸的危险。必须使用与厂家推荐的相同或相近型号的电池。按照生产厂的建议处理废弃电池。

FCC Class A Notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

The Class A limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

NOTE: This unit was tested with shielded cables on the peripheral devices. Shielded cables must be used with the unit to ensure compliance with FCC emissions limits.

For more information on safety guidelines, regulatory compliances, EMI/EMF compliance, accessibility, and related topics, **click here**.

Conventions Used in this Guide

In this user guide, the following are used:

NOTE: A note draws attention to important information.

TIP: A tip provides a suggestion to make working with the application easier.

CAUTION: A caution indicates a potential hazard to equipment or data.

WARNING: A warning warns of things or actions that might cause injury, death, or other severe consequences.

Commands are written in the fonts shown here:

```
^ARMerge Scene,,Op1 scene 1,1^B51^W^C
```

```
[Ø1]RØØØ4ØØ3ØØØØ4ØØØØ8ØØØØ6ØØ[Ø2]35[17][Ø3]
```

```
Esc X1 *X17* X20* X23* X21CE←
```

NOTE: For commands and examples of computer or device responses mentioned in this guide, the character "Ø" is used for the number zero and "O" represents the capital letter "o."

Computer responses and directory paths that do not have variables are written in the font shown here:

```
Reply from 208.132.180.48: bytes=32 times=2ms TTL=32
```

```
C:\Program Files\Extron
```

Variables are written in slanted form as shown here:

```
ping xxx.xxx.xxx.xxx –t
```

```
SOH R Data STX Command ETB ETX
```

Selectable items, such as menu names, menu options, buttons, tabs, and field names are written in the font shown here:

From the **File** menu, select **New**.

Click the **OK** button.

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Trademarks

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Introduction

The Extron® VTT001 twisted pair (TP) transmitter series and VTR001 twisted pair receiver series provide a system for sending VGA, RGBHV, and RGBS signals up to 500 feet (150 meters) over Extron Skew-Free™ A/V UTP cable. They can also send these signals over CAT 5/5e/6 UTP cable.

Both transmitter and receiver have remote power capability. For transmission distances up to 300 feet, the applied power is required at either the transmitter or the receiver. Greater distances require power to be applied locally to both transmitter and receiver.

Depending on the model, both transmitter and receiver modules may be mounted in a wall, a rack, or in other Extron products that accept a double-sized MAAP connector panel (such as CPM101, CPM200, and CPM112R), or Extron AAP mounting products; or they may be set on a tabletop. The MAAP models come in a black or white finish; the AAP model comes in black, white, or gray finish; and the tabletop model comes in a black finish.

The following table specifies the maximum recommended transmission distances for the VTT001/VTR001 pair at 60 Hz.

Video Resolution	Recommended Maximum Range
640 x 480	500 feet
800 x 600	400 feet
1024 x 768*	300 feet
1280 x 960*	200 feet
1280 x 1024*	200 feet
1360 x 765	200 feet
1365 x 768	200 feet
1366 x 768	200 feet
1440 x 900	200 feet
1440 x 1050	200 feet
1600 x 1200*	150 feet
1920 x 1080	150 feet

NOTE: Video Resolutions marked with an asterisk (*) have the same range specification at 75 Hz.

NOTES:
- Extron recommends using at least 50 feet of TP cable between the transmitter and the receiver.
- It is possible to exceed the recommended distances. However, image quality may be reduced.

Features

- **Video sharpness control** — Optimizes the video image for different cable lengths between transmitter and receiver.
- **Removable faceplate** — The module faceplate may be removed for tabletop use or attachment to an equipment rack.
- **Compatibility** — The VTR001 receiver series also functions as the receiver for output from the Extron IN1404XT video scaler, Extron TP T 15HD A, TP T 15HD AV, TP T BNC, TP T 15HD 45, TPX 88, TPX 88 A, and TP T BNC DA4.
- **Remote power capability** — Both transmitter and receiver can be powered remotely when cable runs are 300 feet or less.

Installation

The Installation section describes:

- Rear Panel Connectors
- Front Panel Connector and Indicator
- Cabling and Setup

Rear Panel Connectors

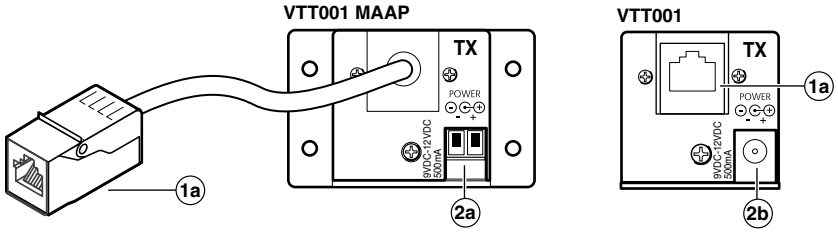


Figure 1. VTT001 MAAP and VTT001 Rear Panel Views

NOTE: The VTT001 MAAP and VTT001 models differ in how they are mounted (see **Mounting**).

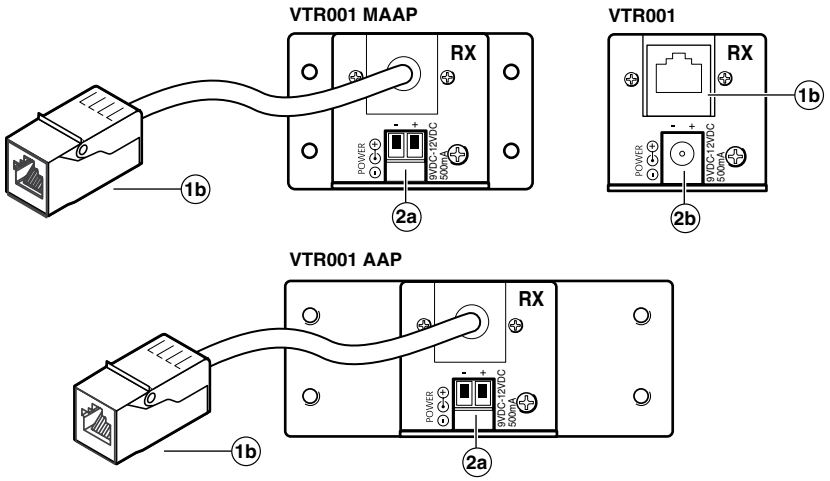


Figure 2. VTR001 MAAP, VTR001, and VTR001 AAP Rear Panel Views

NOTE: The VTR001 MAAP, VTR001 AAP, and VTR001 models differ in how they are mounted (see **Mounting**).

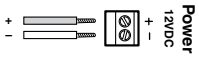
1a **Transmitter output connector** — A female RJ-45 connector on a 3 inch pigtail for the VTT001 MAAP, or within the VTT001 model. Plug this connector to the UTP cable going to the receiver.

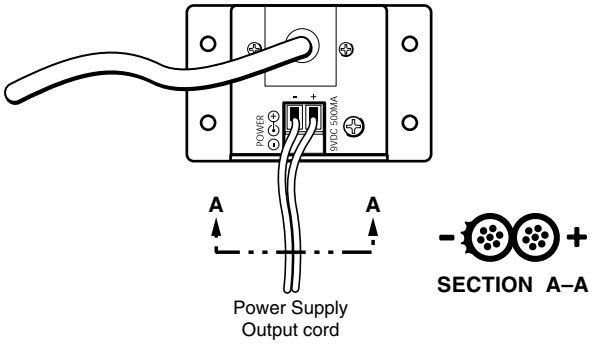
> **CAUTION:** Do not connect the transmitter to a computer data or telecommunications network.

1b **Receiver input connector** — A female RJ-45 connector on a 3 inch pigtail for the VTR001 MAAP and VTR001 AAP models, or within the VTR001 model. Plug this connector to the UTP cable coming from the transmitter.

> **CAUTION:** Do not connect the receiver to a computer data or telecommunications network.

2a **Captive screw input power connector** — Connect the included 12 VDC external power supply to the 2-pole female direct insertion captive screw connector. The VTT001 MAAP, VTR001 AAP, and the VTR001 MAAP have this captive screw connector.





> **CAUTIONS:**
> - Always use a power supply supplied by or specified by Extron. Use of an unauthorized power supply voids all regulatory compliance certification and may cause damage to the supply and the end product.
> - Unless otherwise stated, the AC/DC adapters are not suitable for use in air handling spaces or in wall cavities. The power supply is to be located within the same vicinity as the Extron A/V processing equipment in an ordinary location, Pollution Degree 2, secured to the equipment rack within the dedicated closet, podium or desk.
> - The installation must always be in accordance with the applicable provisions of National Electrical Code ANSI/NFPA 70, article 75 and the Canadian Electrical Code part 1, section 16. The power supply shall not be permanently fixed to building structure or similar structure.

To verify correct polarity before connection, check the power supply no load output with a voltmeter.

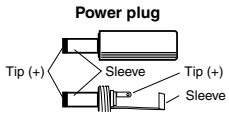
> **WARNING:** The two power supply leads must be kept separated while the power supply is plugged into an electrical outlet. Remove power before wiring.

CAUTION: Do not tin the stripped power supply leads before inserting them into the captive screw connector. Tinned leads are not as securely attached as untinned leads and could slip out.

NOTE: Both transmitter and receiver have remote power capability. For transmission distances up to 300 feet, the power is required only at either the transmitter or the receiver. Greater distances will require power to be applied to both transmitter and receiver.

(2b) **Power input jack** — Connect the included 12 VDC external power supply to this female jack. The VTT001 and the VTR001 use this power input connector (see the note, caution, and warning for (2a) above).

The male power plug that connects to this input jack is shown on the right.



CAUTIONS:
- Always use a power supply supplied by or specified by Extron. Use of an unauthorized power supply voids all regulatory compliance certification and may cause damage to the supply and the end product.
- Unless otherwise stated, the AC/DC adapters are not suitable for use in air handling spaces or in wall cavities. The power supply is to be located within the same vicinity as the Extron A/V processing equipment in an ordinary location, Pollution Degree 2, secured to the equipment rack within the dedicated closet, podium or desk.
- The installation must always be in accordance with the applicable provisions of National Electrical Code ANSI/NFPA 70, article 75 and the Canadian Electrical Code part 1, section 16. The power supply shall not be permanently fixed to building structure or similar structure.

Front Panel Connector and Indicator

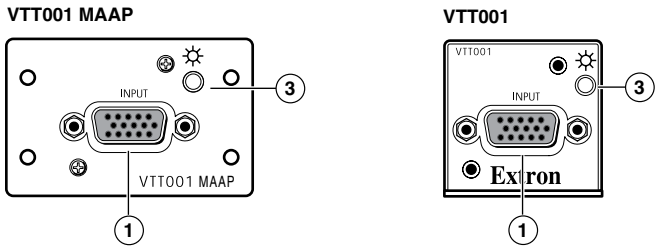


Figure 3. VTT001 MAAP and VTT001 Front Panel Views

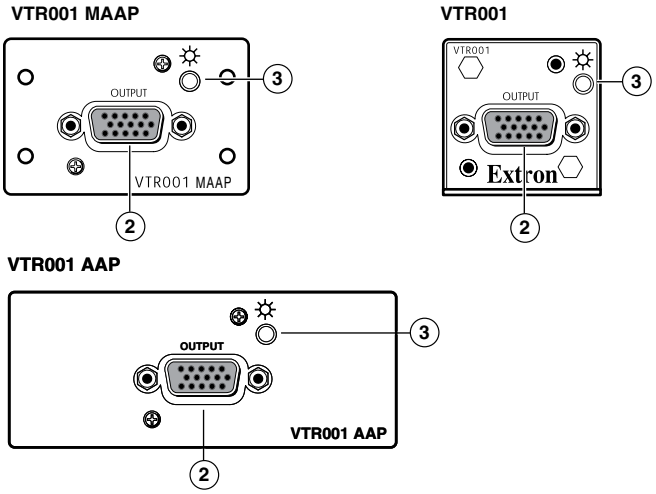


Figure 4. VTR001 MAAP, VTR001, and VTR001 AAP Front Panel Views

NOTE: The VTR001 MAAP, VTR001 AAP, and VTR001 models differ in how they are mounted.

The AAP version has a larger faceplate than the VTR001 MAAP.

① **Transmitter video input connector** — A female 15-pin HD VGA input for all models. Plug a RGBHV/RGBS video signal into this connector.

② **Receiver video output connector** — A female 15-pin HD VGA connector for all models. Connect a monitor, LCD projector, or other display device to output an RGBHV or RGBS video signal.

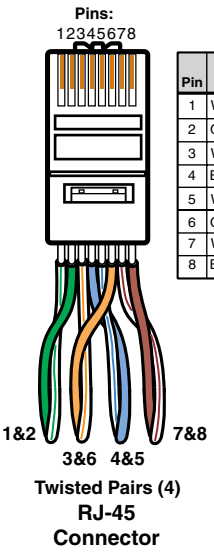
③ **Power LED indicator** — The LED lights green whenever power is applied.

Cabling and Setup

To install the VTT001 MAAP and VTT001 models and the VTR001 MAAP, VTR001 AAP, and VTR001 models, follow these steps:

1. Turn all of the equipment off and, if applicable, disconnect it from the power source.
2. Connect the RJ-45 connectors of the transmitter and receiver to either end of the UTP cable (see **Cable Testing** and **Equalizing Pair Skew**).

NOTE: RJ-45 termination must comply with the TIA/EIA T568A or TIA/EIA T568B wiring standards for all connections, as shown below.



Pin	TIA/EIA T568A Wire color	TIA/EIA T568B Wire color	RGB Video Signal
1	White-green	White-orange	Red/V. sync +
2	Green	Orange	Red/V. sync -
3	White-orange	White-green	Power
4	Blue	Blue	Green +
5	White-blue	White-blue	Green -
6	Orange	Green	Power
7	White-brown	White-brown	Blue/H. sync +
8	Brown	Brown	Blue/H. sync -

Figure 5. RJ-45 Pin Terminations

NOTES:
- For best results, use Extron Skew-Free A/V UTP cable, available in bulk or in various pre-terminated lengths. If necessary, regular CAT 5 cable may be used. CAT 5e and CAT 6 cables are not recommended.
- If you are using Enhanced Skew-Free™ A/V cable, use the TIA/EIA T-568-A standard only.

3. Connect the external power supply to the transmitter, the receiver, or both. Both transmitter and receiver have remote power capability. For transmission distances up to 300 feet, the applied power is only required at either the transmitter or the receiver. Greater distances require power to be applied locally to both transmitter and receiver.
4. Connect an output display device to the 15-pin HD video output connector of the receiver.
5. Connect a RGBHV/RGBS video source to the 15-pin HD video input connector of the transmitter.
6. Power up the video input and output devices, then apply power to the power supply and test for the display output. Adjust the sharpness, if necessary (see **Sharpness Adjustment**). If a problem is encountered, check all connections before proceeding further.
7. If the previous display test was successful, power off and disconnect all equipment, detach all cables, and install the mountable transmitter and/or receiver (see **Mounting**).

NOTE: If the transmitter or receiver is to be wall-mounted and the power supply will be inaccessible, power must be applied to the power supply before final mounting.

Compatibilty with Other Extron Products

The VTT001 series and VTR001 series products can communicate with other Extron products. The following tables indicate how the products interact.

	TP T 15HD A	TP T 15HD AV	TP T BNC	TP T BNC DA4	TP T AV	TP T 460	TP T 468	IN1404XT	TP T 15HD 45
VTR001 series	A	A	A	A	B	A	A	A	A

	TP R BNC AV	TP R BNC A	TP R AV	TP R 15HD A
VTT001 series	A	A	B	A

A = RGB video only
B = incompatible

NOTE: The VTT001 series and VTR001 series will not power the compatible Extron products remotely.

Cable Testing

To ensure proper cable termination, each transmission cable system that uses CAT 5e or CAT 6 cable should be tested (Extron Skew-Free A/V UTP cable does not need to be tested). Testing the cable from the RJ-45 connections at the transmitter and receiver gives the most accurate indications of cable problems.

There are two varieties of cable runs: simple runs, in which a single cable is terminated only at the transmitter and receiver; and complex runs, which can include patch bays and multiple terminations and lengths of cable. In either case, the entire cabling system should be tested.

A complete test measures cable length and tests the wire map, attenuation, NEXT, PSNEXT, ELFEXT, PSELFEXT, return loss, ACR and PSACR. All of these tests are critical for digital data transfer. While all of these tests are important indicators of the quality of the cable termination, the most critical testing parameters for video transfer are wire map (T568A or T568B termination) and pair length measurements. The largest concern is equalization of skew between cable pairs. Cable systems of 300 feet or less should exhibit no transmission problems if they pass at least CAT 5e or preferably CAT 6-D5 channel certification testing.

The Microtest OMNI SCANNER 2 performs comprehensive certification testing to the proposed CAT 6 standards. Other manufacturers also make testing equipment. The tests include advanced diagnostics for troubleshooting the cause and location of many cable and termination problems. For simple installation testing, the Microtest MICRO SCANNER PRO tests wire map and cable length, including individual cable pair length.

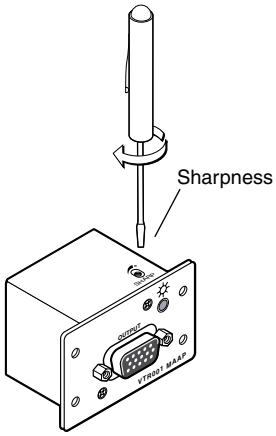
Equalizing Pair Skew

Pair skew issues are eliminated when you use Extron Skew-Free A/V UTP cables.

The manufacturing process for CAT 5e or CAT 6 network UTP cable leads to a condition called pair skew. For best results, pair skew needs to be equalized when using the CAT 5e or CAT 6 cable in A/V applications. The design of Extron's Skew-Free A/V UTP cable minimizes pair skew to the point that equalization is not required.

Skew exists between pairs when the physical length of one wire pair is different from another. As the transmission cable length increases, the amount of skew increases. Skew affects the displayed image when the differential length between wire pairs exceeds two feet, causing the timing of the red, green, and blue video signals to appear out of alignment (horizontal registration errors). A white vertical line on a black field can appear as individual red, green, and blue lines that are close together; the signal transmitted on the shortest wire pair leads the other colors and appears to the left on the display.

UTP cable test equipment measures and reports wire pair length. The report on the various pair lengths can be used in equalizing pair skew. The nominal velocity of propagation (NVP — the speed at which the signal travels on the transmission line, measured as a percentage of the speed of light) of TP cable is very close to that of conventional coaxial cable. The difference in NVP means that an additional length of coaxial cable equal to the length of pair skew, placed on the receiver's output, equalizes the effects of pair skew.



CAT 5 TP cable can lead to registration errors between the red, green, and blue video signals. Pair skew can be measured with test equipment or identified by viewing a crosshatch test pattern closely to determine if either the red, green, or blue video image leads (appears to the left of) the other two video images. These images can be minimized or eliminated by one of the following methods:

- Switch to the Extron Enhanced Skew-Free A/V UTP cable.
- Add a skew compensation cable equal to the length of pair skew to the receiver's output.
- Install an Extron Skew Equalizer, SEQ 100 15HD (part number: 60-676-01), on the video output of the receiver and adjust the skew for the leading video image.

Sharpness Adjustment

The longer the cable being used, the greater the signal loss. The image sharpness may be enhanced by turning a peaking adjustment screw located on the top of the receiver. Increased peaking can compensate for detail (mid- and high-frequency) loss from low bandwidth system components or capacitance in long cables. Adjust this control using the included adjustment tool (Extron part number: 100-014-01LF) while viewing the displayed image to obtain the optimum picture sharpness. Turning the control clockwise increases peaking and turning it counterclockwise decreases peaking.

Mounting

The mountable transmitter (VTT001 MAAP) and mountable receiver (VTR001 MAAP) may be attached to a wall with either a stud-mounted wall box or with a wall mounting bracket (Extron part number: 70-163-xx). Both installations require the double spaced MAAP connector frame, such as the CPM101). The transmitter/receiver module can also be attached to any Extron MAAP device that accepts a double spaced A/V connector panel, or the modules may be rack mounted. The AAP version of the receiver mounts to Extron AAP frames (see **Other Accessories**).

Preparing the Wall Box

For wall and furniture mounting installations, the installation site must be deep enough for both the wall box and the cables. The box should be at least 2.5 inches (6.4 cm) deep. Install cables into the wall, furniture, or conduits before installing a wall box or bracket.

1. Place the wall box or mounting bracket against the installation surface, and mark the guidelines for the opening on the wall or furniture.
2. Cut out the material from the marked area.
3. Insert the wall box or bracket to check the size and fit of the opening. Enlarge or smooth the edges of the opening if needed.
4. If using a wall box, feed cables through the punch-out holes on the wall box, and secure them with cable clamps to provide strain relief.
5. Exposed cable shields (braids or foil) are potential sources of short circuits. Trim back and/or insulate shields with heat shrink.

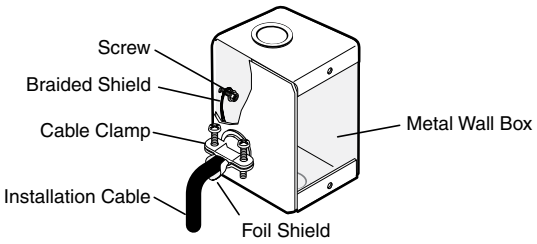


Figure 6. Grounding Outer Braided and Foil Shields

WARNING: To prevent short circuits, the outer foil shield can be cut back to the point where the cable exits the cable clamp. Both braided and foil shields should be connected to an equipment ground at the other end of the cable.

6. Insert the wall box or wall bracket into the opening, and attach it to the wall, stud, or furniture, leaving the front edge flush with the outer wall or furniture surface.

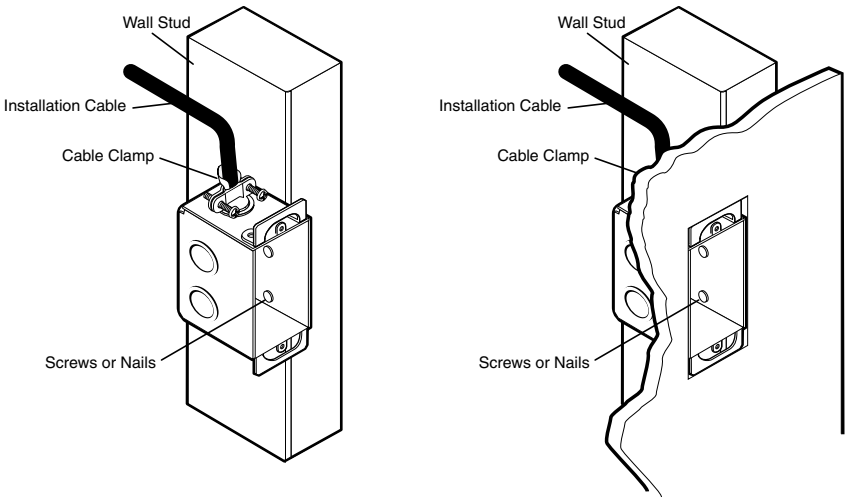


Figure 7. Attaching a Wall Box to a Wall Stud

- To attach a wall box to wood, use four #8 or #10 screws or 10-penny nails. A minimum of 0.5 inch (1.3 cm) of screw threads must penetrate the wood.
- To attach a wall box to metal, use four #8 or #10 self-tapping sheet metal screws or machine bolts with matching nuts.

7. Mount the modules onto a faceplate or frame, then cable and test the transmitter/receiver modules before fastening it into the wall box or bracket. The cables are inaccessible after installation.

Wall box mounting

1. Attach the transmitter/receiver modules to the mounting frame with the included #4-40 screws.
2. Attach all power and video cables to the rear of the transmitter/receiver. Power on the transmitter/receiver now if the external power supply cannot be accessed once the transmitter/receiver is mounted.
3. Attach the mounting frame (with the attached transmitter/receiver modules) to the wall box, using the two included mounting screws.

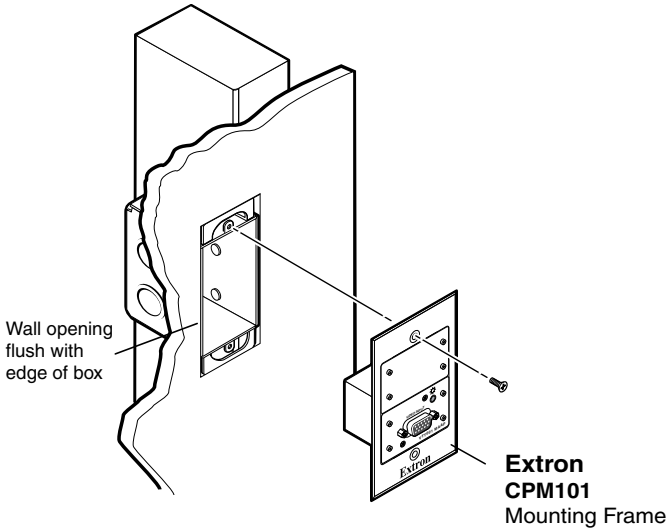


Figure 8. Attaching the Mounting Frame to the Wall Box

4. Connect the video input and output devices to the front faceplates of the transmitter and receiver, respectively.
5. Power on all devices.

Wall bracket mounting

1. Attach the transmitter/receiver modules to the mounting frame with the included #4-40 screws.
2. Attach all power and video cables to the rear of the transmitter/receiver. Power on the transmitter/receiver now if the external power supply cannot be accessed once the transmitter/receiver is mounted.
3. Attach the mounting frame (with the attached transmitter/receiver modules) to the mounting bracket using the two included mounting screws.

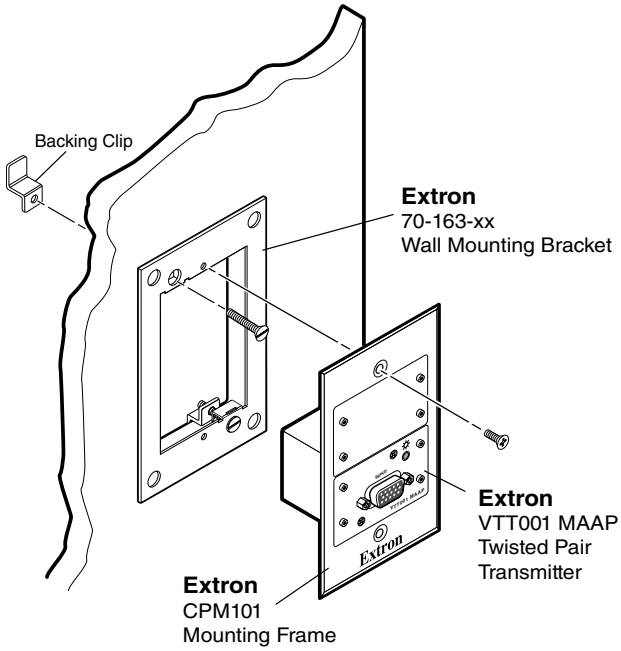


Figure 9. Attaching the Mounting Frame to the Wall Mounting Bracket

4. Attach the video input and output devices to the front faceplates of the transmitter and receiver, respectively.
5. Power on all devices.

AAP mounting

The VTR001 AAP version is mounted to the Extron AAP panel by inserting the two AAP studs through the panel mounting holes and attaching the nuts, as shown below.

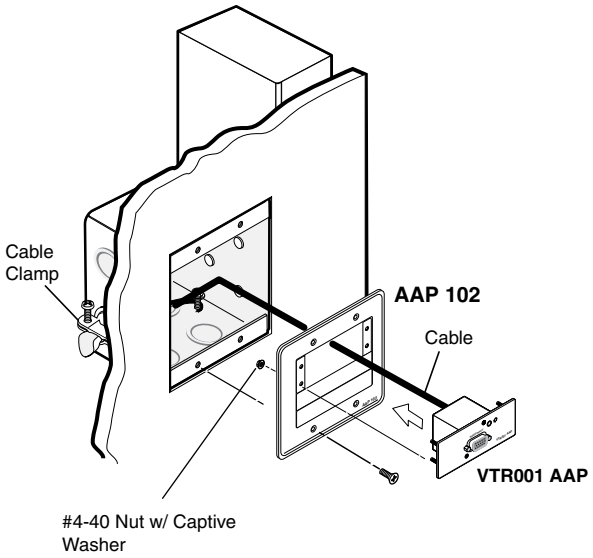


Figure 10. Attaching a VTR001 AAP to an Extron AAP Frame

UL rack mounting guidelines

The following Underwriters Laboratories (UL) guidelines pertain to the safe installation of the device in a rack.

1. **Elevated operating ambient temperature** — If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient temperature. Therefore, install the unit in an environment compatible with the maximum ambient temperature (Tma = +122 °F, +50 °C) specified by Extron.
2. **Reduced air flow** — Install the equipment in a rack so that the amount of air flow required for safe operation of the equipment is not compromised.
3. **Mechanical loading** — Mount the equipment in the rack so that a hazardous condition is not achieved due to uneven mechanical loading.
4. **Circuit overloading** — Connect the equipment to the supply circuit and consider the effect that circuit overloading might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.
5. **Reliable earthing (grounding)** — Maintain reliable grounding of rack-mounted equipment. Pay particular attention to supply connections other than direct connections to the branch circuit (that is, use of power strips).

Rack mounting

Various 1U rack space frames accommodate the VTT001 MAAP, VTR001 MAAP, and VTR001 AAP modules. The CPM133 is a one-third rack width frame that can be mounted to the IN9080 rack mount shelf. The CPM112R, as shown below, is a full rack width frame that holds six double sized modules.

Depending on the A/V connector frame used, the transmitters/receivers may be mounted to the rack with or without the rack mount shelf.

1. For mounting without a rack mount shelf, mount the transmitter/receiver modules to the A/V connector frame, then attach the frame directly to the rack.

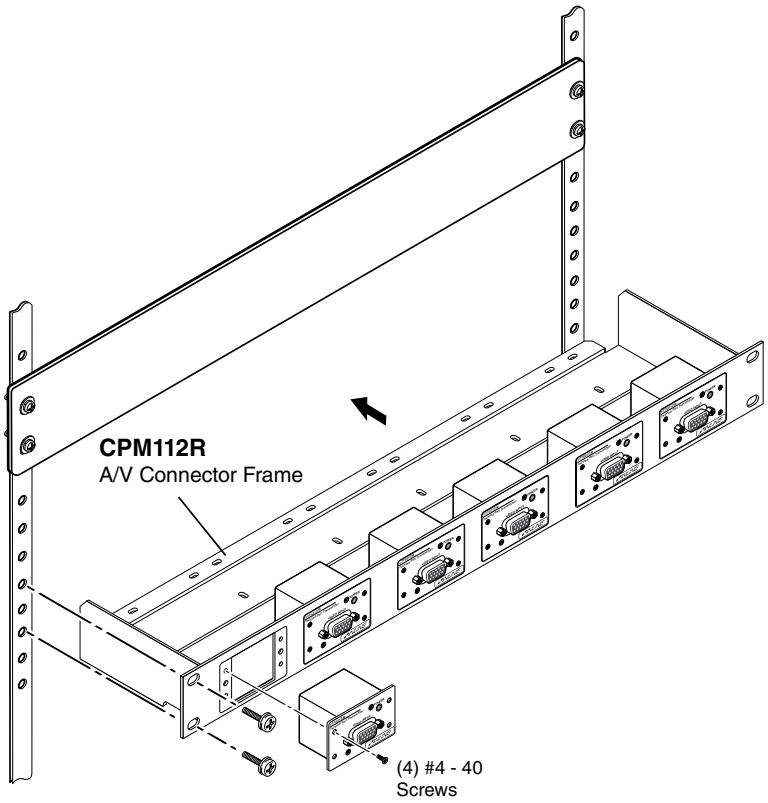


Figure 11. CPM112R A/V Connector Frame Mounted Directly to a Rack

For mounting the VTT001 MAAP or VTR001 MAAP to a rack mount shelf, mount the transmitter/receiver modules to the A/V connector frame, then attach the frame to the shelf, as shown below.

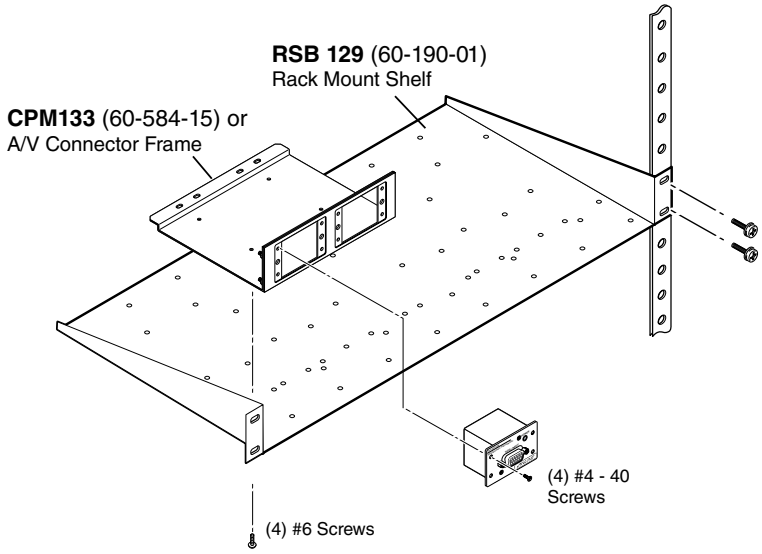


Figure 12. CPM133 A/V Connector Frame Mounted to a Rack Shelf

2. Attach all power and video cables to the rear of the transmitter/receiver. Power on the transmitter/receiver now if the external power supply cannot be accessed once the transmitter/receiver is mounted.
3. Attach the video input and output devices to the front faceplates of the transmitter and receiver, respectively. Power on all devices.

   For mounting the VTR001 AAP to a rack, mount the AAP modules to the Extron AAP frame, then attach the frame to the rack, as shown below.

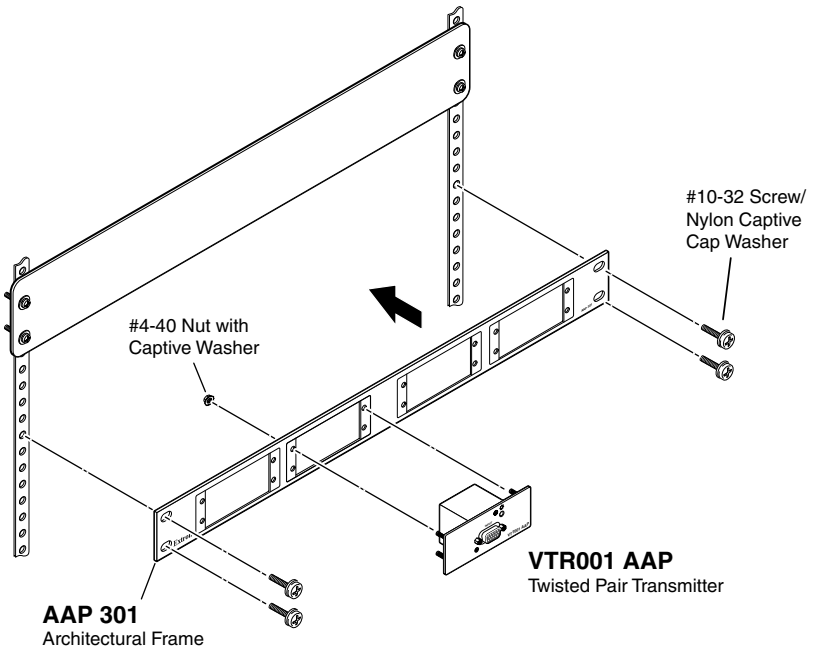


Figure 13. Extron AAP 301 Frame Mounted Directly to a Rack

Reference Information

Specifications

Video

Number/signal type	1 set of proprietary analog signals
Connectors	1 female RJ-45 jack or 1 female RJ-45 jack on a 3" (7.6 cm) pigtail

Video input

Number/signal type	
VTT001 series	RGBHV, RGBS
VTR001 series	1 set of proprietary analog signals from a VTT001 model
Connectors	
VTT001 series	1 female 15-pin HD
VTR001	1 female RJ-45 jack
VTR001 MAAP/AAP	1 female RJ-45 jack on a 3" (7.6 cm) pigtail
Nominal level	0.7 Vp-p for RGB
Minimum/maximum levels	Analog: 0.3 V to 1.45 Vp-p with no offset at unity gain
Impedance	75 ohms
Horizontal frequency	15 kHz to 130 kHz
Vertical frequency	30 Hz to 150 Hz

Video output

Number/signal type	
VTT001 series	1 set of proprietary analog signals
VTR001 series	RGBHV, RGBS
Connectors	
VTT001 series	1 female RJ-45 jack
VTT001 MAAP	1 female RJ-45 on a 3" (7.6 cm) pigtail
VTR001 series	1 female 15-pin HD
Nominal level	0.7 V p-p for RGB
Minimum/maximum levels	0.3 V to 1.45 Vp-p
Impedance	75 ohms
Maximum resolution	1600x1200 or 1080p RGBHV

NOTE: Refer to the user's manual for the maximum distances recommended for specific resolutions.
1080p component video is not supported.

Sync

Input type	
VTT001 series	RGBHV, RGBS
Output type	

VTR001 series	RGBHV, RGBS
Input level	2.0 V to 5.5 Vp-p with ±0.2 VDC offset max.
Output level	3.0 V to 4.0 Vp-p
Input impedance	Hi-Z
Output impedance	75 ohms
Max. propagation delay	580 ns
Max. rise/fall time	45 ns
Polarity	Negative

General

Recommended cable type	CAT 5/5e/6
Power supply	External Input: 100-240 VAC, 50-60 Hz Output: 12 VDC, 1 A, 12 watts

NOTE: The VTT and VTR units will accept 7-15 VDC. However, if an input voltage below the recommended 12 VDC is used, the maximum audio output level will be reduced.

Temperature/humidity	Storage: -40 to +158 °F (-40 to +70 °C) / 10% to 90%, noncondensing Operating: +32 to +122 °F (0 to +50 °C) / 10% to 90%, noncondensing
Cooling	Convection, no vents
Mounting	
Rack mount	Yes, with optional mounting hardware
Furniture or wall mount	Yes, with optional mounting hardware
Enclosure type	Metal
Enclosure dimensions	
VTT001/VTR001 MAAP	
Faceplate	1.4" H x 2.2" W x <0.1" D (3.5 cm H x 5.6 cm W x 0.1 cm D) (double space high MAAP plate)
VTR001 AAP	
Faceplate	1.4" H x 3.5" W x 0.1" D (3.5 cm H x 8.9 cm W x 0.3 cm D) (double space high AAP plate)
VTT001 series	
Device	1.4" H x 1.4" W x 1.4" D (3.5 cm H x 3.5 cm W x 3.5 cm D) (Depth excludes connectors.)
VTR001 series	
Device	1.4" H x 1.4" W x 1.75" D (3.5 cm H x 3.5 cm W x 4.4 cm D) (Depth excludes connectors.)
Product weight	1.0 lbs (0.5 kg)
Shipping weight	3 lbs (2 kg)
Vibration	ISTA 1A in carton (International Safe Transit Association)
Regulatory compliance	
Safety	CE, c-UL, UL
EMI/EMC	CE, C-tick, FCC Class A, ICES, VCCI
MTBF	30,000 hours
Warranty	3 years parts and labor

NOTE: All nominal levels are at ±10%.

NOTE: Specifications are subject to change without notice.

Parts List

VTT001 MAAP and VTR001 MAAP

Description	Part Number
VTT001 MAAP wall mount transmitter - black	70-284-11
VTT001 MAAP wall mount transmitter - white	70-284-21
VTR001 MAAP wall mount receiver - black	70-285-11
VTR001 MAAP wall mount receiver - white	70-285-21
NOTE: The MAAP models mount into MAAP (mini AAP) panels.	

VTT001 and VTR001 Tabletop

Description	Part Number
VTT001 tabletop transmitter - black	60-581-01
VTR001 tabletop receiver - black	60-582-01

VTR001 AAP

Description	Part Number
VTR001 AAP (black)	70-259-11
VTR001 AAP (white)	70-259-21
NOTE: The VTR001 AAP device can be mounted in the Extron AAP panels listed under "**Other Accessories**."	

Included Parts

Description	Part Number
Power supply: universal, 12 VDC, 2.0 A	
Sharpness adjustment tool	
VTT/VTR User Guide	

Skew-Free A/V UTP Cables

Description	Part Number
UTP23SF-4/1000 1000' bulk (non-plenum)	22-141-03
UTP23SF-4P/1000 1000' bulk (plenum)	22-142-03
UTP23SF-4P/25 25' preterminated (plenum)	26-570-04
UTP23SF-4P/35 35' preterminated (plenum)	26-570-05
UTP23SF-4P/50 50' preterminated (plenum)	26-570-06
UTP23SF-4P/75 75' preterminated (plenum)	26-570-07
UTP23SF-4/12 12' preterm. (non-plenum)	26-569-03
UTP23SF-4/25 25' preterm. (non-plenum)	26-569-04
UTP23SF-4/50 50' preterm. (non-plenum)	26-569-06
NOTE: Other cable lengths are available.	

Other Accessories

Description	Part Number
CPM101 MAAP plate, one-gang (black, white)	60-583-11, -21
CPM112R MAAP rack-mount connector panel	60-584-12
CPM133 one-third rack width panel	60-584-15
RSB 129 rack mount shelf	60-190-01
AAP 102 frame (black)	60-300-02
AAP 102 frame (white)	60-300-03
AAP 104 frame (black)	60-301-02
AAP 104 frame (white)	60-301-03
AAP 106 frame (black)	60-531-02
AAP 106 frame (white)	60-531-03
AAP 201 frame - half rack width, 1U (black)	60-302-02
AAP 202 frame - half rack width, 2U (black)	60-303-02
AAP 301 frame - full rack width, 1U (black)	60-632-02
AAP 302 frame - full rack width, 1U (black)	60-633-02

Extron® Warranty

Extron Electronics warrants this product against defects in materials and workmanship for a period of three years from the date of purchase. In the event of malfunction during the warranty period attributable directly to faulty workmanship and/or materials, Extron Electronics will, at its option, repair or replace said products or components, to whatever extent it shall deem necessary to restore said product to proper operating condition, provided that it is returned within the warranty period, with proof of purchase and description of malfunction to:

USA, Canada, South America, and Central America:
Extron Electronics
1001 East Ball Road
Anaheim, CA 92805
U.S.A.

Japan:
Extron Electronics, Japan
Kyodo Building, 16 Ichibancho
Chiyoda-ku, Tokyo 102-0082
Japan

Europe, Africa, and the Middle East:
Extron Europe
Hanzeboulevard 10
3825 PH Amersfoort
The Netherlands

China:
Extron China
686 Ronghua Road
Songjiang District
Shanghai 201611
China

Asia:
Extron Asia
135 Joo Seng Road, #04-01
PM Industrial Bldg.
Singapore 368363
Singapore

Middle East:
Extron Middle East
Dubai Airport Free Zone
F12, PO Box 293666
United Arab Emirates, Dubai

This Limited Warranty does not apply if the fault has been caused by misuse, improper handling care, electrical or mechanical abuse, abnormal operating conditions, or modifications were made to the product that were not authorized by Extron.

NOTE: If a product is defective, please call Extron and ask for an Application Engineer to receive an RA (Return Authorization) number. This will begin the repair process.

USA: (714) 491-1500 **Europe**: 31.33.453.4040
Asia: 65.6383.4400 **Japan**: 81.3.3511.7655

Units must be returned insured, with shipping charges prepaid. If not insured, you assume the risk of loss or damage during shipment. Returned units must include the serial number and a description of the problem, as well as the name of the person to contact in case there are any questions.

Extron Electronics makes no further warranties either expressed or implied with respect to the product and its quality, performance, merchantability, or fitness for any particular use. In no event will Extron Electronics be liable for direct, indirect, or consequential damages resulting from any defect in this product even if Extron Electronics has been advised of such damage.

Please note that laws vary from state to state and country to country, and that some provisions of this warranty may not apply to you.

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+1.714.491.1500 **+1.714.491.1517** FAX	**+1.919.863.1794** **+1.919.863.1797** FAX	**+31.33.453.4040** **+31.33.453.4050** FAX	**+65.6383.4400** **+65.6383.4664** FAX	**+81.3.3511.7656** FAX	**+86.21.3760.1568** **+86.21.3760.1566** FAX	**+971.4.2991880** FAX

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